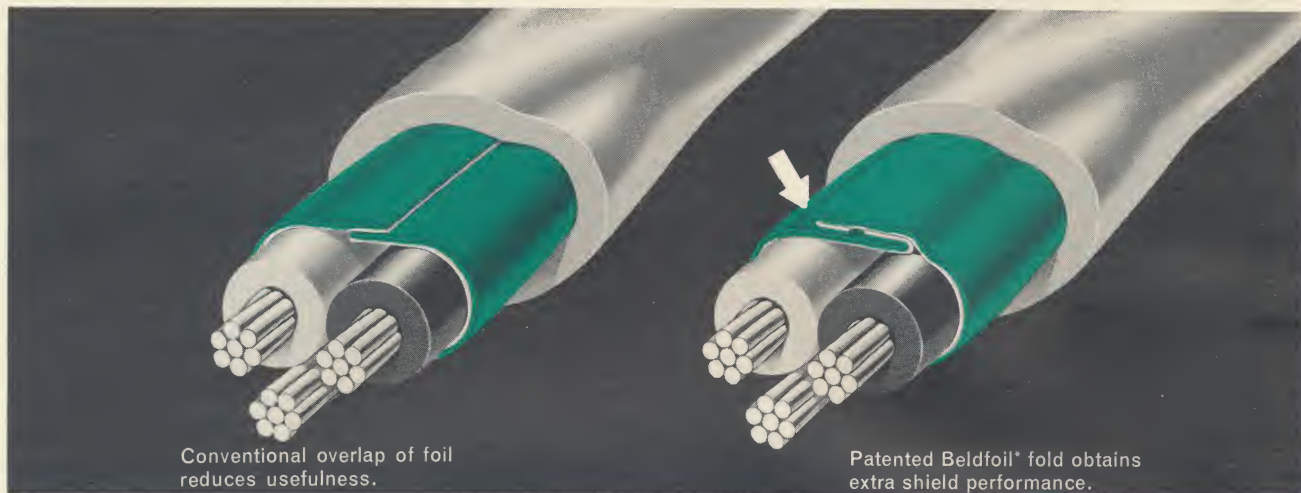


Please unfold this...

It's your copy of a
newly published Wire
and Cable Reference
Chart—presented with
the compliments
of.....

Belden

WIREMAKER FOR INDUSTRY
SINCE 1902—CHICAGO



It's in the fold!

By Frank Timmons, Chief Engineer, Electronics Division, Belden Manufacturing Company

There are a number of cables on the market today which utilize Mylar® Aluminum Shielding to eliminate noise, hum and cross-talk. These cables have been developed to meet the needs of equipment engineers who have found that standard braided and spiral shields are inadequate in reducing pick-up and transmitted noise.

There is a big difference in the various cables available . . . and the big difference is in the manner by which the Mylar Aluminum Shielding is applied to the cable. The cable which does the most effective job of eliminating noise, hum and cross-talk uses a unique, patented wrapping process that "folds back" one or both edges of the Mylar Aluminum Shielding. It provides "total shielding" and was introduced in 1957 by the Belden Manufacturing Company under the trade name, "Beldfoil."

It is evident that many interested persons do not completely understand the manner in which Mylar Aluminum Shielding is used in the manufacture of Beldfoil cable. Therefore, Frank Timmons, Chief Engineer of the Electronics Division at Belden's Richmond, Indiana plant answers some of the more frequently asked questions, and points up some of the more important benefits offered by Beldfoil.

Q. You talk about a patented process where-in the Mylar Aluminum Shielding is folded back . . . on one or both edges. Just how is this done?

A. First, let us define Mylar Aluminum Shielding . . . it is a lamination of Mylar insulation film from 0.0005" to 0.001" thick and aluminum foil of .00035" to .001" thickness, applied spirally around the shielded conductor or conductors to give 100% shield coverage.

In some instances the wires are wrapped with the metal foil on the outside as shown in the cross-sectional drawing Fig. 1.

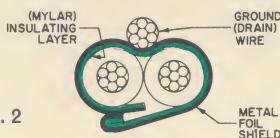
Fig. 1



Note the heavy black line showing the foil edge folded back so that a full layer of Mylar "bonus insulation" is provided between the conductors and the foil shield, increasing the reliability of the cable.

Cables to be used at radio frequencies, or sensitive to radio frequency interference, may need the fold shown in Fig. 2. This fold creates a metal-to-metal connection which eliminates any possible inductive effect, and makes the shield the electrical equivalent of a solid aluminum tube.

Fig. 2

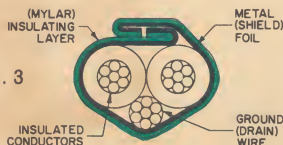


Shields shown in Fig. 1 and 2 are used for cables with one pair of conductors.

For cables carrying multiple pairs of conductors, a different technique is used. On each pair, the aluminum foil is placed on the *inside*, with the Mylar layer on the *outside* (See Fig. 3). This is important because if the aluminum surface were on the outside we would have random metallic contact between the shields on the different pairs of wires. This would permit the voltages existing on one shield to generate currents in the adjacent shield, creating a transfer of energy or cross-talk between circuits.

Note that the outer edge of the shield is folded to tuck the edge of foil out of the way where it cannot short to the adjacent shield.

Fig. 3



The inner fold again provides the electrical equivalent of a solid aluminum tube. Belden calls this combination of two folds in one shield a "Z" fold because an end view of the unwrapped tape shield looks like the letter "Z".

Q. How much signal isolation results between pairs, when aluminum foil is on the inside, and Mylar layer outside?

A. This type of construction obtains isolation of more than 100 db between pairs, per thousand feet of cable, at 10 Kc. The short-circuited tape shield makes the cable quite suitable for use at frequencies ranging from audio to RF.

Q. Do any contact-resistance problems arise between the drain wire and the aluminum foil shield on Beldfoil?

A. No. Belden design and field service experience on millions of cable-feet in wide service environment have proved this point of reliability.

Q. Can Beldfoil shields be used over small single conductors as well as over large complex cables?

A. Yes. Belden applies it on groups from .050" to 1.25" OD.

Q. Design engineers are constantly faced with miniaturization problems. What about the size of Beldfoil shielded cables?

A. Beldfoil definitely reduces the diameter of multi-conductor cables . . . in some instances by as much as 66⅔%. The small diameter provides design engineers with extra conduit space, extra raceway, extra console and rack space.

Q. How can I determine which type of shield I should choose for a given cable?

A. Belden application engineers are available for engineering assistance. Or, you can obtain preliminary printed information by writing to Belden Manufacturing Company, Advertising Department, P.O. Box 5070-A, Chicago, Illinois 60680.

Better Built... Better Buy...



8-7-5

*Belden Trademark Reg. U.S. Pat. Off. †duPont Trademark

1902 . . . Over a period of 63 years, Belden engineers, cooperating with American industry, have developed hundreds, yes thousands of refinements and innovations in electrical and electronic wire and cable . . . refinements and innovations that have helped Belden earn its present position of leadership.

And Belden has published countless technical papers, manuals, magazine articles, engineering booklets and related materials to help design engineers in the correct application of wire and cable. The Wire and Cable Reference Chart presented on succeeding pages is one example of Belden's continuing effort.

From the finest drawn magnet wire to the most complex multi-conductor cables, Belden's many exclusive values including exact, continuous length spools . . . pricing by the unit . . . easy-to-read trade numbers . . . and distributor rack merchandise pre-priced on package . . . help to make it the number one preferred line. Shown on the page to the right is just part of Belden's complete line of electronic and electrical wire and cable—*available from the world's largest wire inventory!*

Belden

WIREMAKER FOR INDUSTRY
SINCE 1902—CHICAGO



Cathode Ray Tube Lead



Shielded Power Supply Cables—Rubber or Vinyl Jacket



Plastic Microphone Cable



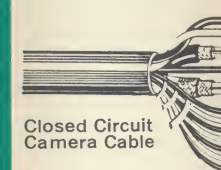
Shielded Interconnecting Cables



Strain Gauge Cables



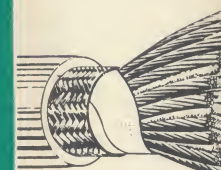
Broadcast Audio Cables



Closed Circuit Camera Cable



75-Ohm Video Cable



Color, Studio, Camera Cables



Cathode Ray Tube Lead



Shielded Power Supply Cables—Rubber or Vinyl



Plastic Microphone Cables



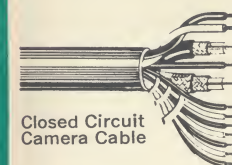
Shielded Interconnecting Cables



Strain Gauge Cables



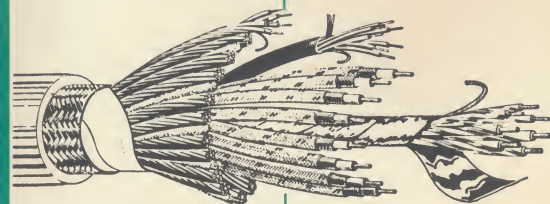
Broadcast Audio Cables



Closed Circuit Camera Cable



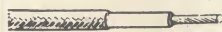
75-Ohm Video Cable



Color, Studio, Camera Cables



Miniaturized Cables



Grid Wires



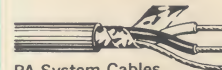
Multi-Conductor Cables



Low Impedance Lines



Call System Cables



PA System Cables



Sound & Alarm System Cables



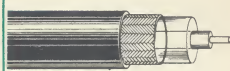
Power Supply Cordage



Industrial Audio & Sound Wires



Magnet Wire



60 KV D.C. High Voltage Cable



TV Distribution Cables



Multiple Pair Individually Shielded RF Cables



Test Prod Wires



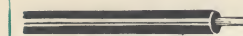
2 & 3 Conductor Extension Cords



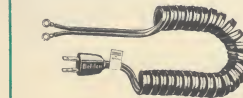
Mil-Spec Wires



Lamp Cordage



Teflon* Hook-Up Wires
*DuPont Trademark



Coiled Cords



Multiple Pair Individually Shielded Audio and Data Cables



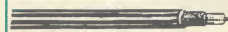
Automation Cable



Language Lab Cables



Miniature Coaxial Cables



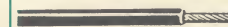
RG/U Transmission Line Cables



3-Conductor Power Cords



Rubber Microphone Cables



Hook-Up Wires



Duplex Wires



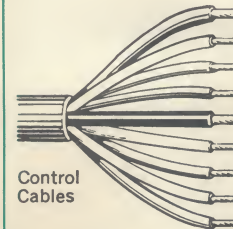
Multiple Pair Cables



Shielding & Bonding Cable



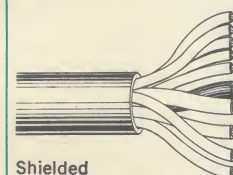
Miniature Microphone Cables



Control Cables



Unshielded Audio Cables



Shielded Control Cables



Coiled Test Prod Wire



RG/U Cables



Shielded Cables



Miniature Audio Cables



Special Sound Cables

SELECTED FLEXIBLE COAXIAL CABLE GUIDE

MAJOR GROUP	IMP. OHMS	RG NO.	PF/ FT.	O.D. IN.	MIL JKT. TYPE	CENTER COND.	MAX. OPER. VOLTS (RMS)	LBS./ 100'	APPLICABLE SPECIFICATION
50	50	5A/U	28.5	0.328	II	16S	3000	8.7	JAN-C-17A
	50	5B/U	28.5	0.328	IIa	16S	3000	8.7	MIL-C-17D
	52	8/U	29.5	0.405	I	7/21C	5000	10.6	JAN-C-17A
	52	8A/U	29.5	0.405	IIa	7/21C	5000	10.6	MIL-C-17D
	51	9/U	30	0.420	II	7/21S	5000	15.	JAN-C-17A
	51	9A/U	30	0.420	II	7/21S	5000	15.	JAN-C-17A
	50	9B/U	30	0.420	IIa	7/21S	5000	15.	MIL-C-17D
	52	14A/U	29.5	0.545	IIa	10C	7000	21.6	MIL-C-17D
	52	17/U	29.5	0.870	II	.188C	11000	47.	JAN-C-17A
	52	17A/U	29.5	0.870	IIa	.188C	11000	47.	MIL-C-17D
	52	19A/U	29.5	1.120	IIa	.250C	14000	74.	MIL-C-17D
	53	21A/U	29	0.332	IIa	16N	2700	8.7	MIL-C-17D
	58	54A/U	26.5	0.250 (max.)	III	7/.0152C	3000	4.1	JAN-C-17A
	53.5	55/U	28.5	0.206 (max.)	III	20C	1900	3.6	JAN-C-17A
	53.5	55B/U	28.5	0.206	IIIa	20S	1900	3.6	MIL-C-17D
	53.5	58/U	28.5	0.195	I	20C	1900	2.9	JAN-C-17A
	50	58A/U	28.5	0.195	I	19/.0071TC	1900	2.9	JAN-C-17A
	50	58C/U	28.5	0.195	IIa	19/.0071TC	1900	2.9	MIL-C-17D
	50	122/U	29.3	0.160	IIa	27/36TC	1900	2.	MIL-C-17D
	50	174/U	30.4	0.100	I	7/34CW	1500	0.8	BuShips
	50	178B/U	29.0	0.075 (max.)	IX	7/38SCW	1000	0.6	MIL-C-17D
	50	188A/U	29.0	0.110 (max.)	VII	7/.0067SCW	1200	1.3	MIL-C-17D
	50	196A/U	29.0	0.080 (max.)	VII	7/38SCW	1000	0.7	MIL-C-17D
	50	213/U	29.5	0.405	IIa	7/.0296C	5000	10.6	MIL-C-17D
	50	214/U	30	0.425	IIa	7/.0296S	5000	15.	MIL-C-17D
	50	217/U	29.5	0.545	IIa	.106C	7000	21.6	MIL-C-17D
	50	218/U	29.5	0.870	IIa	.195C	11000	49.1	MIL-C-17D
	50	223/U	29.5	0.216	IIa	.035S	1900	3.6	MIL-C-17D
75	75	6A/U	20	0.332	IIa	21CW	2700	8.2	MIL-C-17D
	75	11/U	20.5	0.405	I	7/26TC	5000	9.6	JAN-C-17A
	75	11A/U	20.5	0.405	IIa	7/26TC	5000	9.6	MIL-C-17D
	74	13/U	20.5	0.420	I	7/26TC	5000	12.6	JAN-C-17A
	75	34B/U	21.5	0.630	IIa	7/.0249C	6500	22.4	MIL-C-17D
	73	59/U	21	0.242	I	22CW	2300	3.2	JAN-C-17A
	75	59B/U	21	0.242	IIa	.023CW	2300	3.2	MIL-C-17D
	78	108A/U	24.5 (max.)	0.235	IIa	2—7/28TC (Twin)	1000	2.9	MIL-C-17D
	75	140/U	21	0.233	V	.025SCW	2300	4.5	MIL-C-17D
	95	22/U	16	0.405	I	2—7/.0152C (Twin)	1000	15.1	JAN-C-17A
93	95	22B/U	16	0.420	IIa	2—7/.0152C (Twin)	1000	15.1	MIL-C-17D
	93	62/U	13.5	0.242	I	22CW	750	3.8	JAN-C-17A
	93	62B/U	13.5	0.242	IIa	7/32CW	750	3.8	MIL-C-17D
	93	71/U	14.5 (max.)	0.250 (max.)	III	22CW	750	4.6	JAN-C-17A
	93	71B/U	14.5 (max.)	0.250 (max.)	IIIa	22CW	750	4.6	MIL-C-17D
	95	180B/U	15.5	0.145 (max.)	IX	7/38SCW	1500	2.2	MIL-C-17D
	95	195A/U	15.5	0.155 (max.)	VII	7/38SCW	1500	2.5	MIL-C-17D
125	125	63/U	10	0.405	I	22CW	1000	8.3	JAN-C-17A
	125	63B/U	10	0.405	IIa	22CW	1000	8.3	MIL-C-17D
185	185	114/U	6.5	0.405	I	33CW	1000	8.7	JAN-C-17A
	185	114A/U	6.8 (max.)	0.405	IIa	.007CW	1000	8.7	MIL-C-17D

RED PANEL INDICATES COAXIAL CABLE FOR HIGH TEMPERATURE OPERATION.

ABBREVIATIONS:

S = Silver coated copper, C = Bare Copper, TC = Tinned Copper
CW = Copperweld, SCW = Silver coated copperweld N = Nichrome

COMMON WIRE

MATERIAL	INS. RES.	VOLT. BREAK-DOWN (NOMINAL)	RES. TO COLD FLOW	RES. TO ABRA-SION	CAPAC-ITANCE
RUBBER	Good	Good	Exc.	Exc.	Good
SILICONE RUBBER	Good	Good	Good	Poor	Fair
NEOPRENE	Poor	Fair	Exc.	Exc.	Poor
POLYVINYL CHLORIDE (PVC)—STANDARD	Good	Good	Fair	Good	Fair
POLYVINYL CHLORIDE (PVC)—PREMIUM	Good	Good	Fair	Good	Fair
POLYETHYLENE—SOLID	Exc.	Exc.	Poor	Good	Exc.
POLYETHYLENE—FOAM	Exc.	Poor	Poor	Poor	Exc.
TEFLON (TFE & FEP)	Exc.	Good	Fair	Exc.	Exc.
NYLON	Poor	Poor	Good	Exc.	Poor
POLYPROPYLENE	Exc.	Exc.	Fair	Exc.	Exc.

*When properly pigmented to resist ultraviolet light **FEP Teflon 200°C Max.

BARE CO

AWG	DIA. MILS	CROSS-SECT. AREA CIR. MILS	LBS. PER 1000 FT.	BREAKING STRENGTH (LBS.)		RESISTANCE OHMS PER 1000 FT. 20°C	
				SOFT (ANL)	MED. HARD	SOFT (ANL)	MED. HARD
10	101.9	10,380	31.43	314.0	467.5	0.999	1.033
11	90.7	8,230	24.92	249.0	372.9	1.260	1.303
12	80.8	6,530	19.77	197.5	297.5	1.588	1.643
13	72.0	5,180	15.68	156.6	237.2	2.003	2.072
14	64.1	4,110	12.43	124.2	189.2	2.525	2.613
15	57.1	3,260	9.86	98.5	150.9	3.184	3.295

REFERENCE CHART

ELECTRONIC INDUSTRIES

Manufacturing Co. • Copyright 1965 • CHILTON COMPANY • Chestnut and 56th Sts. • Philadelphia, Pa. 19139 • Price \$1.00

INSULATIONS

				SOLVENTS—HYDROCARBONS		
FLAME RETARD. PROPERTIES	PLIABILITY	WEATHER-ABILITY	TEMP. RANGE °C (NOMINAL)	ALIPHATIC (ALCOHOL-GLYCOL)	AROMATIC (GASOLINE-BENZINE)	CHLORINATED (TRI-CHLORO-ETHYLENE)
Poor	Exc.	Poor	—40° to 70°	Poor	Poor	Poor
Poor	Exc.	Exc.	—60° to 200°	Good	Fair	Good
Good	Exc.	Exc.	—30° to 90°	Good	Poor	Poor
Exc.	Good	Exc.	—20° to 80°	Poor	Poor	Fair
Exc.	Good	Exc.	—55° to 105°	Poor	Poor	Fair
Poor	Fair	Exc.*	—60° to 80°	Poor	Poor	Poor
Poor	Good	Exc.*	—60° to 80°	Poor	Poor	Poor
Exc.	Fair	Exc.	**—70° to 250°	Exc.	Exc.	Exc.
Poor	Poor	Exc.	—40° to 120°	Exc.	Good	Exc.
Poor	Poor	Exc.*	—20° to 105°	Good	Poor	Poor

COPPER WIRE

AWG	DIA. MILS	CROSS-SECT. AREA CIR. MILS	LBS. PER 1000 FT.	BREAKING STRENGTH (LBS.)		RESISTANCE OHMS PER 1000 FT. 20°C	
				SOFT (ANL)	MED. HARD	SOFT (ANL)	MED. HARD
34	6.3	39.7	0.120	1.25	2.04	260.9	269.9
35	5.6	31.4	0.095	0.990	1.63	329.0	340.4
36	5.0	25.0	0.076	0.785	1.30	414.8	429.2
37	4.5	20.2	0.060	0.623	1.03	523.1	541.2
38	4.0	16.0	0.0476	0.494	0.823	659.6	682.4
39	3.5	12.2	0.0377	0.392	0.656	831.08	860.5

CONDUCTOR CONFIGURATIONS

For a given AWG wire size (based on equal cross-sectional area of conductor), limpness and flex life are increased by use of a large number of fine strands. It follows, costs are also increased with fine stranding.

TYPICAL APPLICATION:	AMERICAN WIRE GAGE							
	12	14	16	18	20	22	24	26
FIXED SERVICE	19 x 25	Solid or 19 x 27	Solid or 19 x 29	Solid or 7 x 26 or 16 x 30	Solid or 7 x 28 or 10 x 30	Solid or 7 x 30	Solid or 7 x 32	Solid or 7 x 34
HOO-K-UP WIRE CABLE IN RACEWAY								
MODERATE FLEXING	65 x 30	19 x 27 or 41 x 30	19 x 29 or 26 x 30	16 x 30 or 41 x 34	7 x 28 or 10 x 30 or 19 x 32 or 26 x 34	7 x 30 or 19 x 34	7 x 32 or 10 x 34	7 x 34
FREQUENTLY DISTURBED FOR MAINTENANCE								
SEVERE FLEXING	165 x 34	104 x 45	65 x 34 or 104 x 36	41 x 34 or 65 x 36	26 x 34 or 42 x 36	19 x 34 or 26 x 36	19 x 36 or 45 x 40 *	7 x 34 or 10 x 36 *
MICROPHONES TEST PRODS								
MOST SEVERE DUTY—MERCURY SWITCHES	259 x 36 (7 x 37** Rope Lay)	168 x 36 (7 x 24 Rope Lay)	105 x 36 (7 x 15 Rope Lay)	63 x 36 (7 x 9 Rope Lay)	105 x 40 (3 x 35 Rope Lay)	(Consider braid or tinsel)		

*Composite constructions consisting of 4 strands Copperweld and 3 strands copper are frequently used for severe flexing in small size cables. #25 AWG (4 x 33 Copperweld + 3 x 33 Copper) is popular in microphone cables.

**Rope Lay is several stranded groups cabled together. For example:
#12 AWG, 259 x 36 is 7 cords each consisting of 37 strands of #36 AWG.

COMMON CONDUCTOR MATERIALS

MATERIAL	DC RESISTANCE COMPARED TO ANNEALED COP.	R-F RESISTANCE COMPARED TO ANNEALED COP.	TENSILE STRENGTH (PSI)	
			ANNEALED	HARD
COPPER	100%	100%	35,000	66,000
COPPERWELD® 40% LC	250%	100%	50,000	96,000
COPPERWELD® 30% HM	333%	100%	70,000	130,000
CADMIUM BRONZE 99% Cu, 1% Cd	115%	115%	38,000	90,000
ALUMINUM ^a	164%	164%	17,000 ^a	23,000

	75	140/U	21	0.233	V	.025SCW	2300	4.5	MIL-C-17D
93	95	22/U	16	0.405	I	2—7/.0152C (Twin)	1000	15.1	JAN-C-17A
	95	22B/U	16	0.420	IIa	2—7/.0152C (Twin)	1000	15.1	MIL-C-17D
	93	62/U	13.5	0.242	I	22CW	750	3.8	JAN-C-17A
	93	62B/U	13.5	0.242	IIa	7/32CW	750	3.8	MIL-C-17D
	93	71/U	14.5 (max.)	0.250 (max.)	III	22CW	750	4.6	JAN-C-17A
	93	71B/U	14.5 (max.)	0.250 (max.)	IIIa	22CW	750	4.6	MIL-C-17D
	95	180B/U	15.5	0.145 (max.)	IX	7/38SCW	1500	2.2	MIL-C-17D
	95	195A/U	15.5	0.155 (max.)	VII	7/38SCW	1500	2.5	MIL-C-17D
	125	125	63/U	10	0.405	I	22CW	1000	8.3
125		63B/U	10	0.405	IIa	22CW	1000	8.3	MIL-C-17D
185	185	114/U	6.5	0.405	I	33CW	1000	8.7	JAN-C-17A
	185	114A/U	6.8 (max.)	0.405	IIa	.007CW	1000	8.7	MIL-C-17D

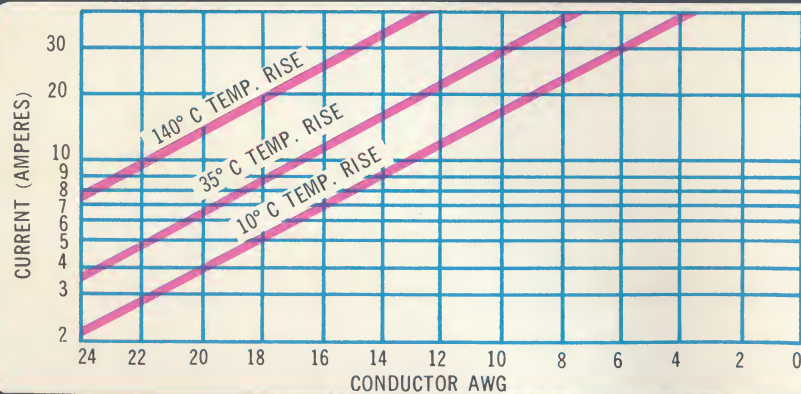
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JACKETS

JACKET TYPE	DESCRIPTION	TEMP. RANGE	JACKET TYPE	DESCRIPTION	TEMP. RANGE
I	Black Vinyl	-40°C to 80°C	IIIa	Black Polyethylene	-55°C to 80°C
II	Gray Vinyl (non-contaminating)	-55°C to 80°C	V	Fiberglass, silicone-impregnated varnish	-55°C to 250°C
IIa	Black Vinyl (non-contaminating)	-55°C to 80°C	VII	White TFE Teflon	-70°C to 200°C
III	Clear Polyethylene	-55°C to 80°C	IX	Brown FEP Teflon	-70°C to 200°C



TEMPERATURE
RISE OF
CONDUCTORS
SURROUNDED
BY STILL
AIR AT 25°C

CORRECTION FACTORS FOR CURRENT CARRYING CAPACITY

NO. OF CONDUCTORS	MULTIPLYING FACTOR
1	1.6
2-3	1.0
4-5	0.8
6-15	0.7
16-30	0.5

BARE COP

AWG	DIA. MILS	CROSS-SECT. AREA CIR. MILS	LBS. PER 1000 FT.	BREAKING STRENGTH (LBS.)		RESISTANCE OHMS PER 1000 FT. 20°C	
				SOFT (ANL)	MED. HARD	SOFT (ANL)	MED. HARD
10	101.9	10,380	31.43	314.0	467.5	0.999	1.033
11	90.7	8,230	24.92	249.0	372.9	1.260	1.303
12	80.8	6,530	19.77	197.5	297.5	1.588	1.643
13	72.0	5,180	15.68	156.6	237.2	2.003	2.072
14	64.1	4,110	12.43	124.2	189.2	2.525	2.613
15	57.1	3,260	9.86	98.5	150.9	3.184	3.295
16	50.8	2,580	7.82	78.1	120.3	4.016	4.154
17	45.3	2,050	6.20	61.9	96.0	5.064	5.239
18	40.3	1,620	4.92	49.2	76.5	6.385	6.606
19	35.9	1,290	3.90	39.0	61.0	8.051	8.330
20	32.0	1,020	3.09	30.9	48.7	10.15	10.50
21	28.5	812	2.452	24.5	38.8	12.80	13.24
22	25.3	640	1.945	19.4	30.9	16.14	16.70
23	22.6	511	1.542	15.4	24.7	20.36	21.06
24	20.1	404	1.223	12.7	19.7	25.67	26.56
25	17.9	320	0.970	10.1	15.7	32.37	33.49
26	15.9	253	0.770	7.98	12.5	40.81	42.22
27	14.2	202	0.610	6.33	9.97	51.47	53.24
28	12.6	159	0.484	5.02	7.95	64.9	67.1
29	11.3	128	0.384	3.98	6.34	81.8	84.7
30	10.0	100.0	0.304	3.16	5.05	103.2	106.8
31	8.9	79.2	0.241	2.50	4.03	130.1	134.6
32	8.0	64.0	0.191	1.99	3.21	164.1	169.8
33	7.1	50.4	0.152	1.58	2.56	206.9	214.1

63 years of assistance to
design and development engine

PER WIRE

AWG	DIA. MILS	CROSS-SECT. AREA CIR. MILS	LBS. PER 1000 FT.	BREAKING STRENGTH (LBS.)		RESISTANCE OHMS PER 1000 FT. 20°C	
				SOFT (ANL)	MED. HARD	SOFT (ANL)	MED. HARD
34	6.3	39.7	0.120	1.25	2.04	260.9	269.9
35	5.6	31.4	0.095	0.990	1.63	329.0	340.4
36	5.0	25.0	0.076	0.785	1.30	414.8	429.2
37	4.5	20.2	0.060	0.623	1.03	523.1	541.2
38	4.0	16.0	0.0476	0.494	0.823	659.6	682.4
39	3.5	12.2	0.0377	0.392	0.656	831.08	860.5
40	3.1	9.61	0.0299	0.311	0.523	1,049	1,085
41	2.8	7.84	0.0237	0.246	0.415	1,323	1,368
42	2.5	6.25	0.0188	0.195	0.329	1,668	1,725
43	2.2	4.84	0.0149	0.155	0.261	2,103	2,176
44	2.0	4.00	0.0118	0.123	0.207	2,652	2,743
45	1.76	3.10	0.00981	0.09		3200	
46	1.57	2.46	0.00775	0.07		4050	
47	1.40	1.96	0.00593	0.054		5290	
48	1.24	1.54	0.00436	0.04		7200	
49	1.11	1.23	0.00366	0.033		8570	
50	0.99	0.980	0.00303	0.027		10,400	
51	0.88	0.774	0.00234	0.023		13,400	
52	0.78	0.608	0.00184	0.017		17,000	
53	0.70	0.490	0.00148	0.013		21,200	
54	0.62	0.384	0.00116	0.011		26,900	
55	0.55	0.302	0.000916	0.006		34,300	
56	0.49	0.240	0.000727	0.0052		43,200	

COMMON CONDUCTOR MATERIALS

MATERIAL	DC RESISTANCE COMPARED TO ANNEALED COP.	R-F RESISTANCE COMPARED TO ANNEALED COP.	TENSILE STRENGTH (PSI)	
			ANNEALED	HARD
COPPER	100%	100%	35,000	66,000
COPPERWELD® 40% LC	250%	100%	50,000	96,000
COPPERWELD® 30% HM	333%	100%	70,000	130,000
CADMIUM BRONZE 99% Cu, 1% Cd	115%	115%	38,000	90,000
ALUMINUM ³	164%	164%	17,000 ⁴	23,000

- (1) Flex life will, in general, be improved by use of higher strength material.
- (2) Theoretically, annealed material will have longer fatigue life than hard. However, in practice the stiffness of hard material frequently tends to restrict the sharpness of bend, resulting in improved life.
- (3) Aluminum used in aircraft and power distribution for weight reduction. Not normally used for electronic applications.
- (4) $\frac{3}{4}$ hard.

TABULATION OF CABLE-SHIELD QUALITIES

	COPPER BRAID	COPPER SERVED	CONDUCTIVE TEXTILE	ALUM-MYLAR FOIL	CONDUCTIVE PLASTIC
SHIELD EFFECTIVENESS A-F	Good	Good	Fair	Exc.	Fair
SHIELD EFFECTIVENESS R-F	Good	Poor	Poor	Exc.	Poor
NORMAL % OF COVERAGE	60—95%	90—97%	100%	100%	100%
FATIGUE LIFE	Good	Fair	Exc.	Fair*	Good
TENSILE STRENGTH	Exc.	Fair	Poor	Poor	Poor
TERMINATION METHOD	Comb & Pigtail	Pigtail	Drain Wire	Drain Wire	Drain Wire

*Special Techniques can provide excellent fatigue life for use in retractile cords.

Belden

WIREMAKER FOR INDUSTRY
SINCE 1902—CHICAGO

Belden Manufacturing Company

P.O. Box 5070-A,

Chicago, Illinois 60680

CONDUCTOR COATINGS

BARE COPPER (NO COATING)
LOW COST OXIDIZES RAPIDLY
DIFFICULT SOLDERING
HIGH CONTACT RESISTANCE

TINNED COPPER
MODERATE COST RESISTS OXIDATION
•SOLDERS EASILY

SILVER COATED COPPER
HIGH COST LOW R-F LOSS
USED WITH TEFLON TO 200°

NICKEL COATED COPPER
HIGH COST
USED WITH TEFLON TO 260°
DISCOURAGES SOLDER WICKING
NOT RECOMMENDED WITH CRIMP TERMINALS